4.	*Prunus Cerasus* (dwarf cherry)	April 22
5.	*Prunus Padus* (bird cherry)	,, 24
6.	*Pyrus communis* (wild pear)	,, 23
7.	*Pyrus malus* (crab apple)	,, 28
8.	*Syringa vulgaris* (lilac)	May 4
9.	*Lonicera tatarica* (Tartarian honeysuckle) ...	,, 4
10.	*Narcissus poeticus* (poet's narcissus)	,, 5
11.	*Aesculus hippocastanum* (horse-chestnut) ...	,, 7
12.	*Cratægus oxyacantha* (hawthorn)	,, 9
13.	*Cytisus laburnum* (laburnum)	,, 15
14.	*Sarothamnus vulgaris* (common broom) ...	,, 14
15.	*Cydonia vulgaris* (common quince)	,, 16
16.	*Sorbus aucuparia* (mountain ash)	,, 17
17.	*Sambucus nigra* (common elder)	,, 28
18.	*Secale cereale* (rye)	,, 28
19.	*Atropa belladonna* (deadly nightshade) ...	,, 29
20.	*Vitis vinifera* (grape vine)	June 13
21.	*Tilia Europæa* (*grandifolia*) (lime tree) ...	,, 22
22.	*Lilium candidum* (white lily)	July 1

B.—First Fruit Ripe

23.	*Ribes rubrum*	June 21
24.	*Lonicera tatarica*	July 1
25.	*Sorbus aucuparia*	,, 30
26.	*Atropa belladonna*	Aug. 2
27.	*Sambucus nigra*	,, 11
28.	*Aesculus hippocastanum*	Sept. 17

Observations of the species 1, 3, 8, 11, 17, 22, and 27 are specially requested, as one of the undersigned (Dr. Ihne) is at present occupied with the preparation of a phænological map for Europe. Observations made either this year or previously, but not yet published, should be sent to one of the undersigned, and will be esteemed a favour. In what way (*inter alia*) it is possible to utilise the observations, may be understood from the comparative phænological map of Central Europe, by H. Hoffmann (*Petermann's Geographische Mittheilungen*, January, 1881.)

H. Hoffmann

Giessen, February 25 Egon Ihne

Rime Cloud observed in a Balloon

In the question whether the cloud that floated over Paris, January 25, consisted of microscopical atoms of solidified water or of minutest globules of liquid water cooled below zero, discussed under this heading in Nature, vol. xxv. p. 337, 385, 436, M. de Fonvielle adduces (p. 436) in favour of the first alternative a new argument, viz. that floating over the cloud in sunshine he has seen upon the cloud only the *corona*, and nothing resembling a rainbow, and he invokes the authority of Bouguer (1744), que "le phénomène [la *corona*] ne se trace que sur les nuages formés de gouttes de vapeur et même sur ceux dont les portraits sont glacées, mais non sur les gouttes de pluie comme l'arc-en-ciel."

I did not expect anything else. M. de Fonvielle could not see a rainbow, because the cloud certainly did not consist of rain-drops; neither could he see a rainbow, when the cloud consisted of minutest particles of liquid water.

It is a well-known fact that small particles of water suspended in air produce no rainbow. When Kratzenstein (1774) advocated the opinion anticipated by Halley (1686), that water-vapour may be condensed in a vesicular state, he availed himself of the observation, that in cloud, and mists, and the condensed steam over boiling water, a rainbow is not to be observed in reflected light. It is not necessary to enter into the question whether the hypothesis of mist-vesicles is to be abandoned, and—as seems to me more probable—the existence of very small solid (*i.e.* not hollow) globules of liquid water is to be admitted for clouds, &c., consisting of the latter; solid water-drops, too, if their dimensions are small enough in comparison to a wave-length of light, cannot cannot produce a rainbow.

So I think it still possible that the cloud observed by M. de Fonvielle, and many mists, which have been described as consisting of ice, may have consisted of liquid water cooled below zero.

In my letter in Nature, vol. xxv. p. 385, read "Hildebrandsson's discussion of the meteorological observations made during the voyage of the *Vega*" for "Hildebrandsson's meteorological observations, &c."; and "Froströg" (*i.e.* frost-smoke) instead of "Frostzög."

Heidelberg, March 11 Hermann Kopp

Water in Australia

The extracts from Australian letters communicated by Mrs. Merrifield remind us again of the important question of water-supply in that thirsty region. Why need the crops be lost for lack of water, when accumulating evidence assures us that in the Tertiary Sandstone of the great central plain there is an abundant supply not many yards from the surface? How can the great gum trees resist the drought as they do unless their roots touch water? Several successful borings have already been made, but probably such works far inland are prevented by the scarcity of fuel for steam power. Prof. Ayrton has now, however, demonstrated that power can be generated wherever coal is plentiful, and transmitted economically and effectively by electric wire to the inland motors. It is probable that within a few years the dynamo machine will prove of more practical value to Australia than to any other country in the world. If there is any novelty or any value in the suggestion of an underground water-supply in the Australian plains, and of obtaining it by the aid of electricity, the credit is due to Mr. Thomas Blunt, of Baxter-gate, Loughborough, not to myself.

Bristol Hill, Leicester, March 25 F. T. Mott

The Solar Spectrum in a Hail-Storm

During the hail storm of Tuesday, the 21st inst., I made observations on the spectrum in various parts of the sky, and was surprised to find the orange lines of a tint decidedly deeper than that of their normal hue. When the hail ceased and the snow began to fall heavily, the lines assumed their usual colour. The rain-band at the time was strong, as might have been expected. I was not before aware that hail would exert this influence on the spectrum. The observations were made with a small pocket spectroscope. C. H. Romanes

Worthing, March 22

Temporary Retinal Effects

In your present week's "Notes" you have referred to the curious experiences of MM. Macé de Lepinay and Nicati, in finding the town lights appear green, after five hours among snow-fields. On the Cima di Jazi, some 16,000 feet or more high, I found another effect. On removing my blue snow-glasses, the sky (at about 10 a.m.) appeared of the deepest indigo colour, while the sun could be looked at without pain, and resembled a harvest-moon close to the horizon, of a red yellow tint, and with a well-defined outline. The effect disappeared as we descended the mountain. As another instance of temporary affliction of the retina, I had been using on the sun, as examined with an 8¼-inch reflector, a miniature spectroscope with fine slit, notwithstanding which the spectrum was very bright. Some hours (not immediately) after, all the gas lamps, candles, &c, appeared of a blood red, and so continued for some hours. This effect still persisted at dinner-time, but gradually and entirely passed off during the meal. No trace of green tint was, in this case, seen. In the sun-glare it is not uncommon with some persons, to find leaves and other small objects on the path, of a red tint. J. Rand Capron

Guildown, March 25

Specific Heat and Thermal Conductivity

Prof. Tyndall, in his lectures on "Heat a Mode of Motion," p. 255, gives a highly-instructive experiment to illustrate the influence of the specific heat of a substance in masking its thermal conductivity. Short prisms of iron and bismuth, having their upper ends coated with wax, are placed upon a vessel of hot water, and the wax is observed to melt first upon the bismuth, in spite of its comparatively low conductivity.

I should like to ask whether others have been uniformly successful in obtaining the above result, at any rate when the bismuth and iron prisms are soldered to the top of the hot water vessel; for this seems to me necessary in order that the experiment may be made with absolute fairness, and independently of any want of uniformity of polish and flatness in the surfaces between which the heat has to pass.

I have tried with cylinders of nearly pure bismuth and best bar iron of various lengths (from 1 cm. to 5 cm.) and diameters, brightly polished, and in some cases wrapped in vulcanised india-rubber, to avoid loss of heat by radiation and convection, and I invariably find that the wax melts upon the iron first.

Moreover, on turning to the tables of conductivity and specific heat, I find for iron and bismuth—

	Iron.	Bismuth.
Ratio of thermal resistances	1 ...	6
,, specific heats	3·7 ...	1

The theoretical resultant effect would seem to be indicated by compounding these ratios, which would still leave a decided balance in favour of iron.

It seems doubtful whether the law, distance of point of equal temperature from source $\propto \sqrt[2]{\text{conductivity}}$, holds good in the case of bad conductors, and in any case it only applies when all parts of the bar have attained a constant temperature.

I must apologise for asking for information on so small a matter, but I should especially like the experiment to succeed if Nature will kindly permit it. At the same time, I hope that I shall not be accused of undue pessimism if I say that, according to my experience, the work of a natural science lecturer is simply a perpetual struggle against the malice of Nature.

Eton College, March 18 H. G. MADAN

Rookeries

CAN any of your readers kindly inform me how to establish a *rookery*. I have tried putting old nests into high elm trees, but they have not been taken to, although rooks are often in the trees. THE MUG

Trueloves, Ingatestone, Essex, March 21

A Means of Saving some Lives in Colliery Explosions

WHATEVER brings about an explosion in a colliery, it appears that men often perish thereby not from burning, nor from injury, but from want of fresh air. It would now be easy, or might soon become so, for every collier, at a small cost, to keep near him always when at work, a little vessel full of compressed air, which being provided with a rather fine nozzle, and a stop-cock, and a small piece of india-rubber tube, might be a sufficient deliverance for him in the moment of need, should he in an explosion have escaped violent injuries. D. RHYS JONES

Carmarthen, March 24

ECONOMIC GEOLOGY OF INDIA[1]

I.—*Precious Stones and Metals*

THE concluding volume of the Manual of the Geology of India was issued from the Calcutta Press towards the last days of 1881, and a supply of copies may now any day be expected to arrive in London. This volume, published by order of the Government of India, brings to a worthy conclusion a most remarkable work, in which we find a general geological sketch map of nearly the whole of India, a descriptive account of its various formations, and a history of those geological products therein found which are of importance to mankind. When we stop to think of the immense area explored, of the enormous amount of details that had to be collected and sorted, of the dangers and trials which were encountered during the investigation of much of the country that had to be explored, we confess to being struck with amazement at the energy, zeal, and courage of the comparatively very small staff employed by our Government in this service, and we feel sure that those labouring in European or American fields will be the first to acknowledge how much is owing to the Geological Survey of India for the quality as well as the quantity of the work done by them in the plains of Asia.

But it is not only the geologists that will find an interest in this the third volume of the Manual. It treats of the economic products of the geological formations of India, and has a far greater interest even for the statesman than for the scientific man, and an interest too for the commercial man and the general reader, nay even more, there is much of interest in this volume for the student of history, for the student of mankind, about the origin of myths, and about the gradual development of the arts of working in iron and gold.

This volume is written by Prof. Valentine Ball, who was, until recently, officiating deputy Superintendent of the Geological Survey of India; an author well known by his pleasant record of many years' work in India, not long since published under the title of "Jungle Life in India," and one who, by many years' assiduous and patient labour as one of the Survey Staff, was fully qualified for the great task so well accomplished in this work. Not only has he brought together in this volume a great store of facts collected by others, but from his own personal knowledge of localities and details, he has been enabled to arrange these facts in orderly sequence in a way few others could have attempted, and he well deserves the high commendation of his chief, the Superintendent of the Survey, who writes: "The student, as well as the man of enterprise, will long owe him gratitude for what he has thus brought within their easy reference."

To give our readers an idea of the contents of this volume, we propose to treat of them in a somewhat arbitrary fashion. In this notice we would call their attention to the Precious Stones and Metals of the East. In a second notice to treat of its Iron and Coal resources, and of the important subjects of its Salt supply and Building Stones. It will not be in any sense our object to treat these subjects in an exhaustive manner, but to indicate to the reader what he will find in the 600 large octavo pages of this work, which is illustrated with numerous maps, lithographic plates, and woodcuts.

The diamond is the most important of the precious stones of India; it can be traced back to Sanscrit literature, in which the first mention of its actual localities is to be found. The famous Koh-i-nur is stated to have belonged to Karna. the King of Anga, about 5000 years ago; but this is not founded on any very reliable evidence. Tavernier and Marco Polo allude to a trade existing in diamonds between Asia and Europe, and before the first diamond mines in Brazil were opened (1728) nearly the whole supply of the old world went from India. There are in India three extensive tracts, widely separated from each other, in which the diamond is known to occur. Besides these principal tracts there are others where diamonds have been found, but precise details are wanting. The most southern of the three great districts has long borne the familiar name of Golconda, though Golconda itself never produced diamonds, and is in fact merely the mart where they were sold and bought. In this southern tract, which is in the Madras Presidency, either are or have been the mines of Kadapah, Bellary, Karnul, Kistna, and Godavari. The second great tract occupies a considerable area between the Mahanadi and Godavari rivers. The third is situated in Bundelkhand, near one of the chief towns of which, Panná, some of the principal mines are situated. In Northern India the diamonds, when found *in situ*, are in a conglomerate which is referred to the Rewah group of the Upper Vindhyan formation, while in Madras they are found under the same circumstances in the Banaganpilly sandstones, which form the base of the Karnul formation.

In connection with this geological position it is interesting to note that these Vindhyan rocks of India have been correlated with the diamond-bearing rocks of the Cape Colony in Africa. The examination of the diamond-bearing strata of India seems to throw no light on the as yet unsettled question of the conditions under which the crystallisation of carbon took place, which resulted in the formation of this precious gem, though synthetical operations in the laboratory seem to tend towards confirming Liebig's view, that it has been formed by crystallisation from a liquid hydrocarbon. It must however be remem-

[1] "A Manual of the Geology of India. Part III. Economic Geology." By V. Ball, M.A., F.G.S., Officiating Deputy Superintendent, Geological Survey of India. Published by order of the Government of India. (Calcutta, 1881.)